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Institute

HAVE THE FOOD LABORATORIES PAID THEIR WAY?

Admittedly, the question that titles this article is somewhat ambitious. It might be implied that in recounting the profits obtained through the Institute's food program effort is being made to harvest the contributions of many other Government, industrial, and institutional research organizations. The truth is that all of these organizations, directly and indirectly, have made advances in ration research possible but it can be said with equal truth that the Institute has served as a kind of fulcrum from which research findings may be pried. Mr. Stegeman in answering this question, common to all research groups and their sponsors, has provided examples where the public funds have been as "bread cast upon the waters." It will be noted that Mr. Stegeman has chosen examples of savings that are well founded in fact and if anything he has erred on the side of conservatism.

Richard R. Stegeman

"Not all industrialists realize that the accomplishments of research are only occasionally spectacular and that the greatest services are rendered in the day-by-day assistance on small things and in the slow, long-range program for future advancement."¹

The truth of this statement by one of the founders of the Associates, Dr. Roy C. Newton, is somewhat beclouded by the frequency and regularity with which revolutionary new products are announced in some of the more "glamorous" fields of chemistry. In the food field, however, it is a rare development which can compete for publicity with a new artificial fiber, antibiotic, or soil conditioner. Spectacular though

//some of the newer developments may be to the food technologist, public reaction generally seems to be aroused primarily by the novelty of the end product—and a cup of coffee, whether prepared from vacuum- or pressure-packed ground coffee, from a dehydrated extract, or from a frozen concentrate, is still a cup of coffee. Fortunately, the combined effect of many individual reactions to a commercial innovation can be determined quite exactly and the success or failure of a new development estimated quite easily.

armed forces accomplishments difficult to appraise

Attempts to appraise the accomplishments of the Food Laboratories, however, are not benefited by an abundance of suitable, quantitative

¹ "Organization of Research Personnel," *Chem. Eng. News*, 27, 680-2 (1949).

data. The "consumer" in the Armed Forces seldom has the opportunity for choice afforded his civilian counterpart—the serviceman usually has only the doubtful choice of eating or refusing to eat a proffered item. Since his reaction is not reflected in sales or profit data, his only effective means of expression is through attitude surveys. Such surveys have proved valuable in guiding the direction of research and development, but the information is largely qualitative. To be completely useful for purposes of appraisal, problems involved in quantifying data must be solved.

It may be found, for example, that changes in specification requirements, such as the recent change in the ration item, Chicken and Vegetables, raising the quantity of chicken as well as changing the proportions of the vegetables, have a pronounced effect upon acceptability of the product in the field—but how can this increased acceptance be translated into monetary units for comparison with the added costs of obtaining the superior product? Or, consider the rapidly rehydrating precooked pea soup (MIL-S-3686) developed about a year ago.² How much is it worth to have available a product which will provide a satisfying soup without any cooking, with no other requirement than hot, or even warm, water?

the crucial question

Much of the effort of the Food Laboratories, both short-range and long-term, is applied to the solution of problems affecting the development of products with higher acceptability, longer storage life, utility features which permit greater flexibility in use, and better retention of nutritive factors—all features

which are presumed to have a definite value, but not necessarily a measurable value. Yet, in these days of ever-increasing budgets, both Federal and industrial, it is important that an answer be sought to the question which is being asked about research with increasing frequency: "Is the money being spent wisely and what can stockholders and taxpayers reasonably expect in the way of productivity from the research and development work being done now and that will be done over the next decade?"³

In spite of the difficulties involved in converting many of the results of work in the Food Laboratories to a dollar and cents basis, it is possible to provide an answer to the question with a few examples of developments which have taken place within the last few years. Savings are not "spectacular," since the Armed Forces have had sufficient experience fighting in and carrying supplies to such widely separated areas of the world that annual savings of millions of dollars on a single item—such as the \$36,662,154 calculated as saved in 1945 by changes in the packaging of evaporated milk⁴—are no longer likely to be shown. The summation of savings on only those examples noted below, however, bears a favorable relationship not only to the cost of these specific developments, but to the cost of operation of the Food Laboratories for the entire period covered.

some savings "success stories"

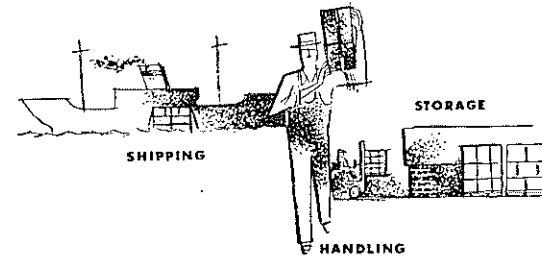
Four-way Frozen Boneless Beef⁵ is a relatively new major subsistence item on which some 15 months' ex-

³ "A Broad Look at Research," *Chem. Eng. News*, 30, 3387 (1952).

⁴ QMFCI *Operation Studies Number One*, Vol. 7, p. 26.

⁵ *Activities Report*, Vol. 3, No. 1 (April 1951).

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Items such as prefabricated meats and dehydrated seasonings permit a more varied overseas diet while conserving vital space and reducing costs.

perience permits demonstration of very substantial savings. Four-way beef is an improvement on the three-way beef used in large quantities during World War II. Exact cost comparisons of four-way vs. three-way beef are not available, since the two products have not been procured simultaneously nor under exactly comparable conditions; cost studies on four-way vs. carcass beef, however, indicate that equivalent quantities of servable meat in either form can be delivered to either the east or west coast at competitive prices, the difference, if any, during the period for which data are available, being in favor of the four-way beef. It is reasonably safe to assume that three-way beef would fall in the same price range, delivered from the packing areas to the coastal areas for shipment.

Storage and overseas shipping charges on the quantity of boneless beef procured in 15 months are estimated (there is some variation since storage periods vary) at approximately \$11,393,000. Since four-way beef represents a saving of seven per cent in space and weight over three-way beef, charges of three-way beef would have been approximately \$12,250,000, or \$867,000 additional, or, reduced to an annual basis, approximately \$693,000. Inasmuch as the product is still being used in large quantities, annual savings of

the same magnitude may be assumed to be continuing.

One newly developed item with which all readers of this publication are familiar is *powdered vinegar seasoning*.⁶ The relatively high-priced ingredients of P. V. S. might be expected to put it in a price-class far above that of ordinary liquid vinegar. On the basis of the first trial procurement, this does not appear to be true—certainly not for vinegar intended for shipment overseas. Savings in bottles, cartons, and domestic shipping charges appear to be sufficient to permit P. V. S. to be delivered to depots in this country, packed for shipment overseas, at about the same price (possibly even a slightly lower price) as liquid vinegar similarly packed. And, when the two products are moved overseas, the advantage in favor of the dry product is immediately apparent. For example, the quantity of vinegar shipped overseas in 1951 could have been moved for \$237,846 less had the dry product then been available.

Furthermore, this potential saving on shipping costs of P. V. S. is but one of the savings expected to result. P. V. S. was developed partially to overcome losses resulting from freezing of the liquid product,

⁶ *Activities Report*, Vol. 3, No. 3 (October 1951) and *Activities Report*, Vol. 4, No. 1 (April 1952).

² *Activities Report*, Vol. 3, No. 1 (April 1951).

with subsequent rupture of the container and possible spoilage of other foods with which the product might come into contact. The lower density of the product should reduce "normal" breakage. In addition, requirements for depot storage space and for handling at depots have both been reduced by about 89 per cent—a very impressive figure.

Considerable Institute effort has recently been devoted to the development of a *specification for processed beans with brown sugar sauce*. Those who attended the Fruit and Vegetable Products Division round table at the 1952 meeting of the Research and Development Associates heard a discussion of the need for the new requirements and participated in a cutting of the new product, which extensive laboratory tests indicate to be a satisfactory alternate for the well-known Boston-style oven-baked beans. There is no intent at present to replace the baked bean with the new product; the "oven-baked bean" label may have a psychological value which could probably best be demonstrated under field conditions. However, should field testing show this product to be a completely desirable replacement for oven-baked beans, annual savings, based on cost analyses of the processes (rather than actual procurement data, since the newly introduced item has not yet been purchased) on the order of \$66,000 or more should be possible.

The estimate noted above is probably unusually conservative. This type of bean (oven-baked or processed with brown sugar sauce) has been used in packaged operational rations for a relatively short time; it is considered likely that the ratio of its use to that of the more familiar tomato sauce bean has not yet become stabilized. Attitude surveys clearly indicate, however, that more

of the new type bean can be used without affecting acceptability.

Hot sauce provides another example of demonstrable savings. In this instance, activity consisted in development of a specification (actually a purchase description) for an item which had previously been procured without such standards. Pre-specification procurements resulted in the delivery of high quality products—but the cost was high. Ordinarily, procurements made without benefit of specifications are acquired at a price which is low, but the quality falls into the same category. In spite of the fact that hot sauce is presently used only by one of the three Services, hot sauce procurements at pre-specification prices would amount to approximately \$91,400 annually at the present rate of use. The specification provides for a product of high quality, which appears to be proving satisfactory. Although quality has been maintained, expenditures for hot sauce, calculated on the basis of a weighted average of prices paid on four recent procurements made in accordance with the new specification, appear to have been reduced to approximately \$30,000 annually.

This annual saving of over \$61,000, on an item of minimal importance when judged on the basis of its relationship to the total subsistence procurement picture, illustrates the wisdom of the policy of buying in accordance with specifications.

As a final example, a current study now nearing completion, with favorable results to date, should result in savings of between a quarter and a half million dollars yearly on chicken procurements. Assuming that field tests now in progress confirm results thus far obtained, specification changes allowing higher scalding temperatures are antici-

pated. Future plans call for extension of the study to turkeys, on which savings of approximately the same magnitude are foreseen.

Additional instances of money-saving developments might be cited, but the pattern would be similar to those already mentioned—savings in shipping costs due to prefabrication or dehydration, savings due to development of new specifications for new items added to the menu, or savings due to development of satisfactory, lower-priced alternates for higher-priced products now in use. However, even without citing additional cases—and without mentioning any of the numerous instances in which evaluation of results must remain on a strictly qualitative basis for the present—it appears obvious that the operations of the Food Laboratories are on a pay-as-you-go basis. With favorable results from a reasonable percentage of investigations on the current and future programs, this situation should persist.

give the credit to teamwork

Throughout this article, attention has been directed to measurable sav-

ings which might be traced to the operations of the Food Laboratories of the Institute. By so doing, the impression may have been left that these savings are attributable to the Food Laboratories alone. Although a deliberate attempt has been made to select samples on which all or most of the development work was done by Food Laboratories' personnel, it is actually doubtful that the savings claimed on most of the items noted above could have been realized without the close cooperation of the American food industry. Assistance in the form of suggestions, constructive criticism, pilot experiments—in fact, assistance on all factors necessary to convert laboratory findings to successful commercial operations—has been instrumental in achieving the considerable progress which has been made. There can probably be little argument with the conclusion that, without this close industry-Government cooperation, the Food Laboratories might not be paying their way—nor would the feeding of the Armed Forces be so far advanced.

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